

ภาคผนวก ฉ.

เอกสารสอบเทียบความถูกต้องของเครื่องมือ

**SMART TECH CALIBRATION & SERVICES CO., LTD.**

14/506 MOO 3, RANGSIT-NAKHON NAYOK ROAD, LAM PHAK KUT,
THANYABURI, PATHUM THANI 12110, THAILAND
Tel. +662-114-3148 Email : stcal.md@gmail.com Website : stc-cal.com



Certificate of Calibration

Certificate No. STCR-2401072-7**Work Order No.** STCR-2401072

Page 1 of 4

Customer Name : C.T. ENVIRONMENT AND CHEMICAL CO., LTD.
9/40-41 M.2 T.Bangkraveng A.Bangkray Nonthaburi 11130

Equipment Name : Electronic Balance
Manufacturer : ZEPPER
Model : BGB224
Serial Number : 22208688
Control Number : N/A
Received Date : Jan 29, 2024
Calibration Date : Feb 4, 2024
Recommended Due Date : N/A
Calibration Method : Calibration Procedure No. CPM-04-03

Environmental Conditions

Ambient Temperature : $(25 \pm 10) ^\circ\text{C}$ **Atmospheric Pressure** : (950 to 1050) hPa
Ambient Relative Humidity : $(50 \pm 30) \% \text{RH}$
Calibration Place : Calibration performed at Customer's facility

Condition as received : Normal

Calibration Result : See data attached

1. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

Date of Issue : Feb 4, 2024

Calibrated by : S. Sompoch

Approved by :

(Mr.Chayut Wongleang)
Laboratory Manager



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Calibration Report

Smart Tech Calibration & Services Co., Ltd.

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Standards Equipment Used

<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
Standard Weight Set	ID.STC-STD042	B0-0601003/24	Jan 8, 2025	ANAB : AC-2695

Traceability

This calibration is traceable to the International System of Unit via :

- ANAB : The ANSI National Accreditation Bord.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2401072-7

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Range capacity : 0 to 220 g

Resolution: 0.0001 g

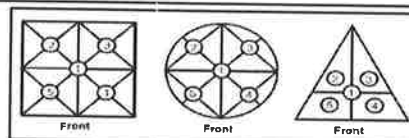
Appearance and Function of Use Inspection : GOOD

1. Repeatability. (n = 10, n = Number of Measurement)

Load (g)	Standard deviation of reading. (g)	Maximum difference between successive reading. (g)
100	0.0000	0.0001
200	0.0000	0.0001

2. Effect of off center loading.

A mass of 50 g was placed to various positions on the pan.
The weighing machine reading error obtained is given in table.



Position 1	Position 2	Position 3	Position 4	Position 5	Maximum difference
50.0000	50.0001	49.9999	50.0001	49.9999	0.0001

3. Linearity

Nominal value (g)	UUC Reading (g)	Correction (g)	(±) Tolerance (g)	Uncertainty of Measurement (± g)	Judgment
No Load	0.0000	0.0000	0.0010	0.00018	Pass
20.0	20.0000	0.0000	0.0010	0.00023	Pass
40.0	40.0000	0.0000	0.0010	0.00040	Pass
60.0	60.0000	0.0000	0.0010	0.00040	Pass
80.0	80.0000	0.0000	0.0010	0.00040	Pass
100.0	100.0000	0.0000	0.0010	0.00040	Pass
120.0	120.0000	0.0000	0.0010	0.00053	Pass
140.0	140.0000	0.0000	0.0010	0.00053	Pass
160.0	160.0000	0.0000	0.0010	0.00053	Pass
180.0	180.0000	0.0000	0.0010	0.00053	Pass
200.0	200.0000	0.0000	0.0010	0.00053	Pass

4. Hysteresis

Load (g)	Hysteresis (g)
100	0.0000

UUC = Unit Under Calibration

Notes :

- 1) Tolerances or specifications report in table above are based on the decision rule requested by the customer.
- 2) Statements of conformity (Judgment) are based on the decision rule described in the last page in this certificate.



Calibration Report

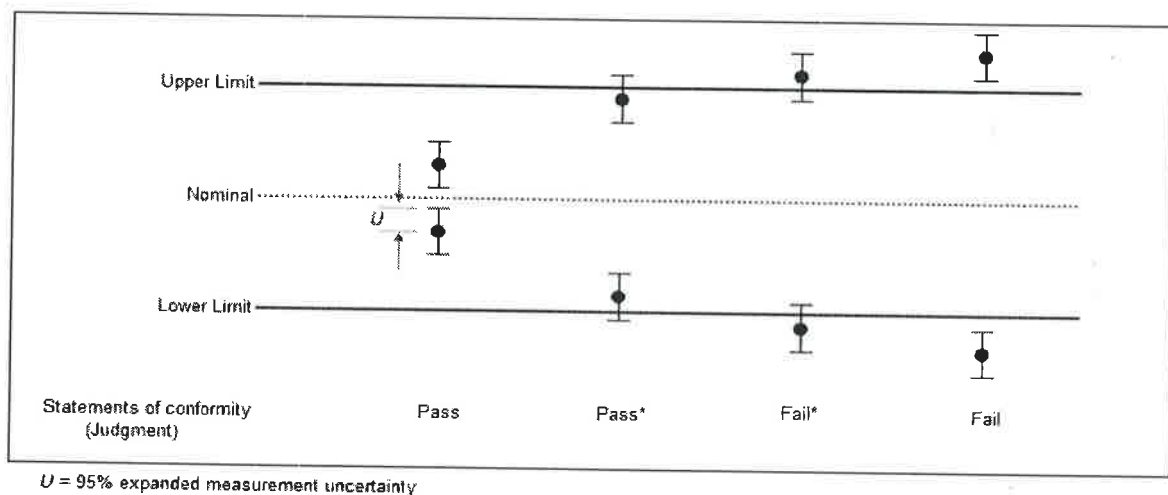
Smart Tech Calibration & Services Co.,Ltd.

Certificate No. : STCR-2401072-7

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Statements of Conformity

The standard decision rule employed for the statement of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on Decision Rules and Statements of Conformity as following Fig. and statements when the measurement uncertainty is taken in to account.



- Pass** : The measurement result plus the expanded uncertainty with a 95% coverage probability were within the specification limit. Then conformity with the specification is stated.
- Pass*** : The measurement result was within the specification limit, but a portion of the expanded uncertainty with a 95% coverage probability was overlapped the specification limit. It is not possible to state conformity using the 95% coverage probability for the expanded uncertainty with although the measurement result was below the limit.
- Fail*** : The measurement result was out of the specification limit, but a portion of the expanded uncertainty with a 95% coverage probability was in the specification. It is not possible to state non-conformity using the 95% coverage probability for the expanded uncertainty although the measurement result was out of the limit.
- Fail** : The measurement result plus the expanded uncertainty with a 95% coverage probability was outside the specification limit. Then non-conformity with the specification is stated.

The measurement results and the statements of conformity with specification only relate to the item calibrated.

When functional verification tests and other inspection without measure uncertainty are performed, the reported results do not affect these statements of conformity.

- End of Certificate -



**SMART TECH CALIBRATION & SERVICES CO., LTD.**

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**Certificate of Calibration**

Certificate No. STCR-2401072-5

Work Order No. STCR-2401072

Page 1 of 4

Customer Name : C.T. ENVIRONMENT AND CHEMICAL CO., LTD.
9/40-41 M.2 T.Bangkrueang A.Bangkrueang Nonthaburi 11130

Equipment Name : pH Meter
Manufacturer : EUTECH INSTRUMENT
Model : PH700
Serial Number : 2055189
Control Number : N/A
Received Date : Jan 29, 2024
Calibration Date : Feb 4, 2024
Recommended Due Date : N/A
Calibration Method : Calibration Procedure No. CPC-04-01, CPC-04-07

Environmental Conditions

Ambient Temperature : $(25 \pm 10) ^\circ\text{C}$
Ambient Relative Humidity : $(50 \pm 30) \% \text{RH}$
Calibration Place : Calibration performed at Customer's facility

Condition as received : Normal

Calibration Result : See data attached

1. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

Date of Issue : Feb 4, 2024

Calibrated by : S. Sompoch

Approved by :



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Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2401072-5

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Standards Equipment Used

<u>Equipment Name</u>	<u>Ref No. / Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>	<u>Traceability to</u>
pH Standard Solution 4.00 pH	PH004.L5	Lot No. 952166	Jan 11, 2026	CPAchem
pH Standard Solution 7.00 pH	PH007.L5	Lot No. 952167	Jan 11, 2026	CPAchem
pH Standard Solution 10.00 pH	PH010.L5	Lot No. 952168	Jan 11, 2026	CPAchem
Documenting Process Calibrator	9257032	5523631030520797	Nov 28, 2024	ANAB : AC-1969
Reference Thermometer Readout	250220030008	TMU2301636	Sep 11, 2024	ANAB : AC-2658
Secondary Reference PRT	04794	TMU2301636	Sep 10, 2024	ANAB : AC-2658

Traceability

This calibration is traceable to the International System of Unit via :

- CPAchem : CPAchem Ltd. (ANAB Cert No AR-1835)
- ANAB : The ANSI National Accreditation Bord.



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

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Results of Calibration: [☒] Without adjustment [☐] With adjustment

Appearance and Function of Use Inspection : GOOD

Result of pH Measurement

STD. Value	UUC. Reading		Correction (pH)	Tolerance ($\pm$ pH)	Uncertainty ($\pm$ pH)	Judgment
	(pH)	(mV)				
4.00 pH	4.00	177.4	0.00	0.010	0.010	Pass
7.00 pH	7.00	0.4	0.00	0.010	0.010	Pass
10.00 pH	9.99	-177.2	0.01	0.010	0.017	Pass

Result of mV Measurement

Nominal Value	Voltage Input (mV)	UUC. Reading		Correction (mV)	Tolerance ($\pm$ mV)	Uncertainty ($\pm$ mV)	Judgment
		(mV)	(pH)				
0.00 pH	414.12	414	-0.04	0.12	0.20	0.90	Pass
4.00 pH	177.48	177.4	4.01	0.08	0.20	0.90	Pass
7.00 pH	0.00	0.0	7.05	0.00	0.20	0.90	Pass
10.00 pH	-177.48	-177.4	10.09	-0.08	0.20	0.90	Pass
14.00 pH	-414.12	-414	14.05	-0.12	0.20	0.90	Pass

Result of Temperature Measurement

Calibration Point	STD. Reading ($^{\circ}$ C)	UUC. Reading ($^{\circ}$ C)	Correction ($^{\circ}$ C)	Tolerance ($\pm$ $^{\circ}$ C)	Uncertainty ($\pm$ $^{\circ}$ C)	Judgment
20.0 $^{\circ}$ C	20.015	20.2	-0.185	0.30	0.15	Pass
25.0 $^{\circ}$ C	25.024	25.2	-0.176	0.30	0.15	Pass

STD = Standard

UUC = Unit Under Calibration

Notes :

- 1) Tolerances or specifications report in table above are based on the decision rule requested by the customer.
- 2) Statements of conformity (Judgment) are based on the decision rule described in the last page in this certificate.
- 3) The measurement uncertainty is not taken into account.



Calibration Report

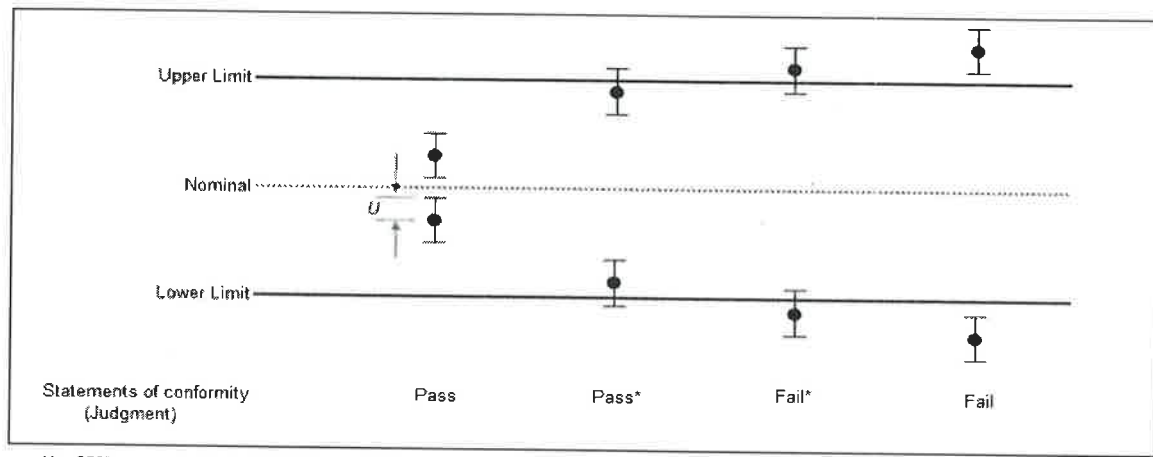
Smart Tech Calibration & Services Co., Ltd.

Certificate No. : STCR-2401072-5

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Statements of Conformity

The standard decision rule employed for the statement of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on Decision Rules and Statements of Conformity as following Fig. and statements when the measurement uncertainty is taken in to account.



U = 95% expanded measurement uncertainty

- Pass** : The measurement result plus the expanded uncertainty with a 95% coverage probability were within the specification limit. Then conformity with the specification is stated.
- Pass*** : The measurement result was within the specification limit, but a portion of the expanded uncertainty with a 95% coverage probability was overlapped the specification limit. It is not possible to state conformity using the 95% coverage probability for the expanded uncertainty with although the measurement result was below the limit.
- Fail*** : The measurement result was out of the specification limit, but a portion of the expanded uncertainty with a 95% coverage probability was in the specification. It is not possible to state non-conformity using the 95% coverage probability for the expanded uncertainty although the measurement result was out of the limit.
- Fail** : The measurement result plus the expanded uncertainty with a 95% coverage probability was outside the specification limit. Then non-conformity with the specification is stated.

The measurement results and the statements of conformity with specification only relate to the item calibrated.

When functional verification tests and other inspection without measure uncertainty are performed, the reported results do not affect these statements of Conformity.

- End of Certificate -

